Section 970

MODIFIED TEST METHOD FOR SOLUBILITY OF TIRE RUBBER MODIFIED ASPHALT BINDERS

970.1 Scope

970.1.1 This test method covers the determination of the degree of solubility in trichloroethylene of tire rubber modified asphalt binders.

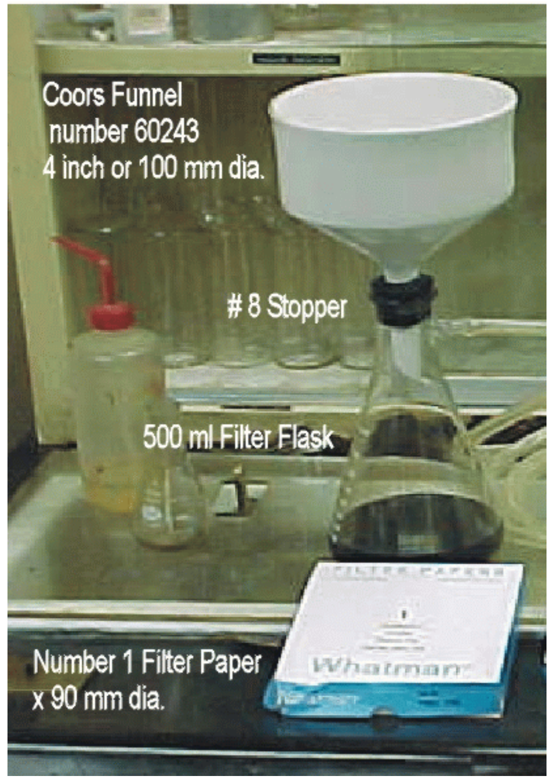

Figure 1

NOTE I-Use of carbon disulfide, carbon tetrachloride, and benzene has been discontinued in this method because of the safety hazards involved. This method is not applicable to tars and their distillation residues or highly cracked petroleum products. For methods covering tars, pitches, and other highly cracked petroleum products and the use of other solvents, see Test Methods D 4, D 2317, D 2318, and D 2764.

970.1.2 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Specific precaution statements are given in Section 970.7.

970.2 Referenced Documents

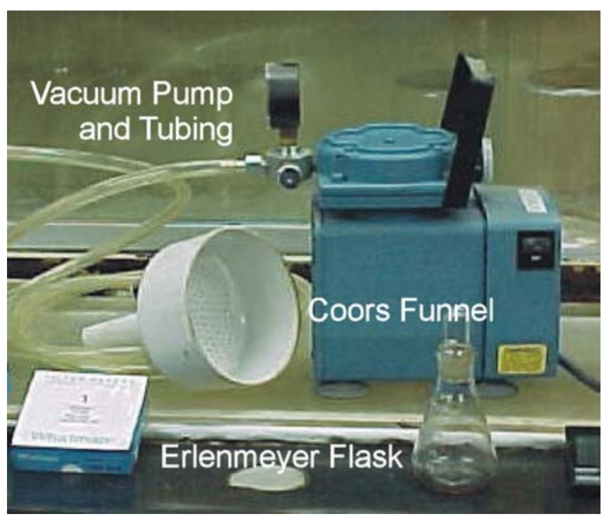

Figure 2

970.2.1 ASTM Standards:

D 2042 Test Method for Solubility of Asphalt Materials in Trichloroethylene
D 4 Test Method for Bitumen Content
D 2317 Test Method for Benzene Insoluble (BI) Content of Tar and Pitch
D 2318 Test Method for Quinoline-Insoluble (QI) Content of Tar and Pitch 2
D 2764 Test Method for Dimethylformamide-Insoluble (DMF-I) Content of Tar and Pitch 2
E 177 Practice for the Use of the Terms Precision and Bias in ASTM Test Methods

970.3 Summary of Method

970.3.1 Asphalt material is dissolved in trichloroethylene and filtered through a 90mm No.1 filter paper. The insoluble material is washed, dried, and weighed.

Figure 3. Wetting Filter paper with diluent in Coors funnel

970.4 Significance and Use

970.4.1 This test method is a measure of the solubility of tire rubber modified asphalt binder in diluents. The portion that is soluble represents the active cementing constituents.

970.5 Apparatus and Materials

970.5.1 The assembly of the filtering apparatus is illustrated in Fig. 1 & 2. Details of the component parts are as follows:

970.5.1.1 Coors funnel, 100 mm diameter, part no. 60243.

970.5.1.2 No. 1 filter paper circle, 90 mm diameter,

970.5.1.3 Filter Flask, heavy-wall, with side tube, 500- or 1000-mL capacity.

970.5.1.4 No.8 stopper

970.5.1.5 Rubber Tubing.

NOTE 2-Other suitable assemblies permitting vacuum filtration may be used.

970.5.1.6 Erlenmeyer flask, 125 mL.

970.5.1.7 Oven, capable of maintaining a temperature of 230 ± 5 EF.

970.6 Reagents

970.6.1 Trichloroethylene, reagent grade

970.7 Safety Precautions

970.7.1 Trichloroethylene is toxic, and proper ventilation is required. It is more flammable than carbon tetrachloride. Use a standard laboratory safety hood that provides a minimum air flow of 100 linear feet per minute. Strict adherence to instructions in material safety data sheets is required.

970.8 Preparation of Filter Paper

970.8.1 Place the filter paper in an oven at 230 ± 5 °F for 5 minutes, allow to cool in a desiccator, and then determine the mass to the nearest 0.1 mg. Designate this mass as **A**. Store in the desiccator until ready for use.

970.9 Sample Preparation

970.9.1 If the sample is not fluid, heat to any convenient temperature, but in any case not more than 230 EF above the softening point. Normally the temperature at which this test is run is not critical, and it may be performed at the laboratory air temperature. For referee tests, however, the flask and sample in solution shall be placed in a water bath maintained at 100 ± 0.5 EF for 1 hour before filtering.

970.10 Procedure

970.10.1 Note safety precautions in Section 970.7. Transfer 2 ± 0.1 g of the sample into a tared 125-mL Erlenmeyer flask or other suitable container. Allow the sample to cool to ambient temperature and then determine the mass to the nearest 1 mg. Designate this mass as **B**. Add 100 mL of the trichloroethylene to the container in small portions with continuous agitation until all lumps disappear and no undissolved sample adheres to the container. Stopper the flask or otherwise cover the container and set aside for at least 15 minutes (see Section 970.9).

970.10.2 Place the previously prepared filter paper into the Coors funnel (Fig. 3). Wet the filter paper with a small portion of trichloroethylene and decant the solution through the filter paper in the Coors funnel with continuous suction. When the insoluble matter is appreciable, retain as much of it as possible in the container until the solution has drained through the filter paper. Wash the container with a small amount of solvent and using a stream of solvent from a wash bottle, transfer all insoluble matter to the filter paper. Use a "policeman" if necessary to remove any insoluble matter adhering to the container. Rinse the policeman and container thoroughly. Wash the insoluble matter on the filter paper with solvent until the filtrate is substantially colorless, then apply strong suction to remove the remaining solvent. Remove the filter paper from the Coors funnel and place it on a rack in an oven until all odor of the trichloroethylene is removed (see safety precautions in Section 970.7). Place the Filter paper in an oven at 230 ± 5 EF for at least 20 minutes. Cool the Filter paper in a desiccator for 30 ± 5 minutes and determine its mass to the nearest 0.1 mg. Repeat the drying and weighing until constant mass (± 0.3 mg) is obtained. Designate this mass as **C**.

970.11 Calculations and Report

970.11.1 Calculate either the total percentage of insoluble matter or the percentage of the sample soluble in the solvent used as follows:

$$\% \text{ Insoluble} = \frac{(C - A)}{B} \times 100$$

$$\% \text{ Soluble} = \frac{B\text{-}(C\text{-}A)}{B} \times 100$$

where:

A = mass of filter paper,
B = mass of sample, and
C = mass of filter paper and insoluble material.

970.11.2 For percentages of insoluble less than 1.0, report to the nearest 0.01 %. For percentages of insoluble 1.0 or more, report to the nearest 0.1 %.